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$$C=\sin\varphi(16{,}209.4583-.0029254M)+\cos\varphi(101{,}111.3767-.12678\,M)-1080.2307+.001874M.$$

For practical application, it is desired to find the mass M which is required to rotate certain known parts of a machine through the angle from $\varphi=13^\circ$ to $\varphi=88^\circ$ in the time $t=2''$.

MECHANICS.

155. Proposed by M. E. GRABER. Graduate Student. Heidelberg University. Tiffin. Ohio.

A parabolic curve is placed in a vertical plane with its axis vertical and vertex downwards, and inside of it, and against a peg in the focus, and against the concave arc, a smooth uniform and heavy beam rests. Find the position of equilibrium.

156. Proposed by W. J. GREENSTREET. A. M., Editor of The Mathematical Gazette, Stroud, Eng.

Three perfectly elastic particles start from the cusp of a smooth cycloid (axis vertical, vertex down) at intervals of t seconds. How long will it be to the nth collision?

DIOPHANTINE ANALYSIS.

115. Proposed by LON C. WALKER, A. M., Graduate Student, Leland Stanford Jr. University. Cal.

Required the least three square integral numbers the difference between the sum of every two of them and the third shall be a square number.

AVERAGE AND PROBABILITY.

142. Proposed by ARTEMAS MARTIN, A. M., Ph. D., LL. D., Washington, D. C.

Two points are taken at random in the arc of a semi-circle, and a third point anywhere in its base. Find the probability that the triangle formed by joining them is acute.

[Unsolved Problem 9955, *Educational Times*, London.]

MISCELLANEOUS.

137. Proposed by L. C. WALKER, A. M., Graduate Student, Leland Stanford Jr. University, Cal.

The first transvectant of the binary cubic and its second transvectant is the *cubicovariant* of the binary cubic.

NOTES.

Mr. Joseph Larmer, Fellow of St. John's College, Cambridge, has been elected Lucasian professor of mathematics to succeed the late Sir George Gabriel Stokes.

D.

Dr. Arnold Emch, heretofore Assistant Professor of Pure and Applied Mathematics in the University of Colorado, has been promoted by the Regents to